AD-A106 046 ARMY ENGINEER DISTRICT ST LOUIS MO F/G 13/13
NATIONAL DAM SAFETY PROGRAM. TRIPOLI VALLEY DAM (MO 30345), MIS--ETC(U)
NOV 78 M J KLOSTERMAN, D W CARTER

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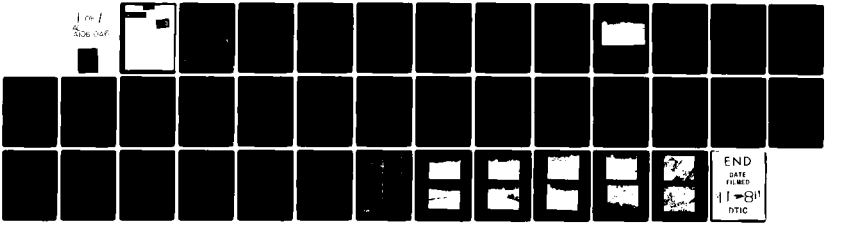

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.		

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

TRIPOLI VALLEY DAM
PHELPS COUNTY, MISSOURI

MISSOURI INVENTORY NO. 30435

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY: ST. LOUIS DISTRICT CORPS OF ENGINEERS
FOR: GOVERNOR OF MISSOURI

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	Tripoli
State Located	Missouri
County Located	Phelps County
Stream	Tributary to Asher Hollow
Date of Inspection	6 September 1978

Tripoli Valley Dam was inspected by an interdisciplinary team of engineers from the St. Louis District, U. S. Army Corps of Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property. The inspection and assessment were made using the "Recommended Guidelines for Safety Inspection of Dams," developed by the Chief of Engineers, U. S. Army, Washington, D. C., with the help of several Federal and state agencies, professional engineering organizations, and private engineers.

Based on these guidelines, this dam is classified as a small size dam with a high downstream hazard potential. Failure would threaten the life and property of approximately 2 families downstream of the dam and cause appreciable damage to two homes, one farm building, one county road, one state road and one recreational area, all within a three-mile damage reach of the dam.

For its size and hazard category, this dam is required by the guidelines to pass from one-half the Probable Maximum Flood (PMF) to PMF. The PMF is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. This dam was evaluated using the one-half PMF because of the possible loss of human life downstream of the dam. It was found that the spillway is only capable of passing 10 percent of the PMF without overtopping the dam. Since the spillway is not capable of passing a minimum of one-half of the PMF without overtopping the dam and perhaps causing failure, the spillway is considered seriously inadequate and the dam is accordingly considered unsafe.

Other deficiencies visually observed by the inspection team were trees on embankment, obstruction of spillway, minor erosion of the upstream face of dam, and lack of erosion protection on the

upstream face of dam. Seepage and stability analyses comparable to the requirements of the guidelines are not on record; this is also a deficiency which should be rectified.

It is recommended that action be taken to implement the remedial measures listed herein in the near future. Any corrective works performed in relation to increasing the spillway size and/or dam height and stability and seepage investigations of the embankment should be made in accordance with analyses and design performed by an engineer experienced in the design of dams. These conclusions were reached by the undersigned inspection team members.

for Nels E. Johnson
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SUBMITTED BY: Jack R. Vienni — Chief, Engineering Division — 17 Nov 78 — Date

APPROVED BY: Leon E. Nelle — Colonel, CE, District Engineer — 20 Nov 1978 — Date

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TRIPOLI VALLEY DAM - ID NO. 30435

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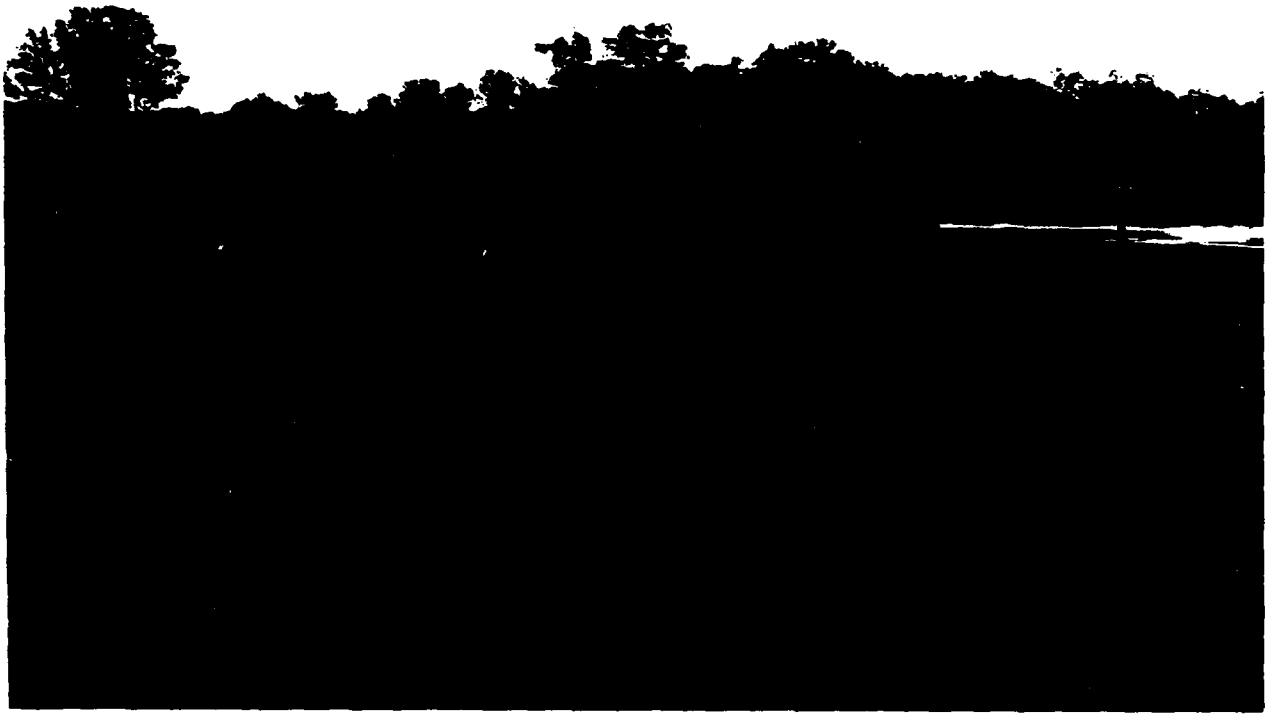

OVER VIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TRIPOLI VALLEY DAM ID NO. 30435

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer directed that a safety inspection of the Tripoli Valley Dam be made.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams." These guidelines were developed with the help of several Federal agencies and many state agencies, professional engineering organizations, and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances.

(1) The dam is an earth structure built in a narrow valley. The topography adjacent to the valley is rolling to steep. The earth embankment is composed of gravelly clay. Topography in the vicinity of the dam is shown on PLATE 1.

(2) Appurtenant structures consist of an ungated spillway and a valve controlled, 6-inch diameter, discharge pipe through the dam.

(3) Pertinent physical data are given in paragraph 1.3 below.

b. Location. The dam is located in the eastern portion of Phelps County, Missouri, in the SE 1/4 of the SE 1/4 of T37N, R6W of the Maramec Spring, Missouri Quadrangle Sheet.

c. Size Classification. Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1c above. Based on these criteria, this dam and impoundment is in the small size category.

d. Hazard Classification. Criteria for determining hazard classification are presented in the same report as referenced in paragraph 1.2c above. Based on referenced criteria, this dam is in the High Hazard Classification.

e. Ownership. This dam is owned by Clara Sooter, 3945 Bayless, St. Louis, Missouri 63125.

f. Purpose of Dam. The dam forms a 6-acre recreational lake.

g. Design and Construction History. The Tripoli Valley Dam was built in 1965 by the Smith Brothers Construction Company. No plans were drawn up for construction of the dam.

h. Normal Operating Procedure. Operating procedures at the dam consist of releases through the discharge pipe whenever the pool appears to be too high to the owner.

1.3 PERTINENT DATA

a. Combined Drainage and Lake Area - 269 acres.

b. Discharge at Damsite.

(1) Estimated ungated spillway capacity at maximum pool elevation - 270 cfs.

(2) Estimated experienced maximum flood at damsite - Unknown.

c. Elevation (Based on an assumed datum of 800 feet msl).

(1) Top of dam (minimum elevation of earth embankment) - 898.0.

(2) Spillway crest - 895.1.

(3) There is no low head outlet.

(4) Maximum tailwater - Unknown.

(5) Streambed at centerline of dam - estimated 873 feet.

d. Reservoir Length of Maximum Pool - 1000 feet.

e. Storage (Acre-feet) at Top of Dam Estimated. 68.

f. Reservoir Surface (Acres).

(1) Top of dam - 8.

(2) Spillway crest - 6.

g. Dam.

(1) Type - earth.

(2) Length - 435 feet.

(3) Height - 26 feet.

(4) Top width - 29 feet.

(5) Side Slopes -

(a) Downstream - 1.5H on 1V (varies)

(b) Upstream - 1H on 1V (varies)

(6) Zoning - unknown.

(7) Impervious Core - unknown.

(8) Cutoff - unknown.

(9) Grout curtain - unknown.

h. Diversion and Regulating Tunnel. None.

i. Spillway.

(1) Type - Ungated

(2) Length of weir - 65 feet.

(j) Regulating Outlets - 6-inch diameter discharge pipe

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data were available on this dam.

2.2 CONSTRUCTION

The dam was built in 1965 by the Smith Brother Construction Co. No additional construction data are available.

2.3 OPERATION

The maximum reservoir loading on the dam is not known. All releases are through an uncontrolled spillway and a discharge pipe.

2.4 EVALUATION

a. Availability. No design data was available.

b. Adequacy. Seepage and stability analyses comparable to the requirements of the "Recommend Guidelines for Safety Inspection of Dam" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for the appropriate loading conditions and made a matter of record.

c. Validity. No valid engineering design data or construction data were available.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. The owner did not accompany the inspection team. There is no other lake in the watershed that would affect Tripoli Lake.

b. Project Geology.

(1) Tripoli Valley is a tributary to a losing (or dry) stream in Asher Hollow which is itself a tributary to the Meramec River. The area is approximately 2-1/2 miles south of Meramec Springs and has the land form features and subsurface hydrologic characteristics typical of karst terrain.

(2) The Tripoli Valley dam and watershed are underlain by Gasconade Dolomite. The damsite itself is founded on residuum and bedrock of the upper Gasconade and, although the divides forming the limits of the watershed may have some Roubidoux residuum, they are composed primarily of Gasconade residuum. The bedrock in the spillway described as "tan to light brown, moderately hard, sedimentary carbonate rock" (paragraph 3.1.b(1)) is an outcrop of Gasconade Dolomite.

(3) Inspection of the watershed area indicated several areas of seeps and springs but, since it had recently rained, it was not possible to determine if they were perennial or intermittent. The small stream leading into the reservoir appears to flow continuously and there is no reason to question that some of the springs are perennial (paragraph 3.1.b(2)).

(4) The "large area with standing water" (paragraph 3.1.c(5)) located on the downstream face near the toe on the east side of the dam appears to be occurring as seepage through the right abutment. The bedrock has been extensively weathered, there is a very irregular and uneven bedrock surface, and it seems very likely that this seepage is occurring through residuum and weathered dolomite underlying the abutment.

(5) Adverse conditions prevented a close inspection of the left abutment. However, no outcrops of particular geologic significance were noted from a safe distance and, since no seepage was reported in the preliminary report, a close inspection was not considered critical.

c. Dam.

(1) No detrimental settlement, cracking, or sinkholes were observed in or near the earth embankments. An embankment cross section at the maximum height section for the dam is shown on PLATE 2. No animal burrows were noted at the dam.

(2) There are some small trees on the dam, mostly on the downstream slope, which include willow trees near the toe where the moist conditions were noted, oak trees up the slope from the willows, and fruit trees. The root systems of the trees constitute a potential seepage hazard. In addition to the trees, there is some heavy vegetation which increases the likelihood of animal burrows which could also create potential seepage hazards.

(3) Based on surface observations, the dam is composed of gravelly clay.

(4) There is no riprap on the dam embankment.

(5) A large area with standing water was observed on the downstream face near the toe on the east side of the dam. The standing water, willow trees and heavy vegetation indicates that there is either a spring in the abutment or there is a steady seepage condition.

(6) There is some erosion on the upstream face of the dam which is caused by surface washing of soil loosened by livestock on the dam.

c. Appurtenant Structures.

(1) Appurtenant structures at Tripoli Dam consist of a spillway and a 6-inch diameter iron pipe with a downstream valve.

(2) The spillway at Tripoli Lake is approximately 65 feet wide and is earth with some grass cover. Downstream of the dam rock outcrops occur in the spillway. The spillway eventually flows into a channel that flows along a "stair step" rock outcrop. A few trees at the entrance of the spillway were observed.

d. Reservoir Area. No pertinent problems were noted in the reservoir area.

e. Downstream Channel. The downstream channel flows down a rock outcrop, across a gravel road and into a pasture. It has some trees, logs and debris in it.

3.2 EVALUATION

Trees and thick vegetation on the embankment and insufficient erosion protection on the upstream face of the dam and spillway are deficiencies which should be corrected. Soft, spongy ground conditions could lead to instability of the embankment if uncorrected. The need for possible seepage control measures should be based upon analysis of the stability and seepage conditions by a professional engineer experienced in the design and construction of dams.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

Operational procedures consist of opening the valve downstream of the embankment to allow water to flow from the reservoir. This lowers the reservoir and reduces the time of flow over the spillway and the fish losses associated with flow over the spillway.

4.2 MAINTENANCE OF DAM

Little maintenance is apparent as evidenced by the vegetative cover and the small trees on the embankment and spillway. There reportedly was a large leak in the west side of the dam which was corrected.

4.3 MAINTENANCE OF OPERATING FACILITIES

None mentioned.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

No warning system is known to exist.

4.5 EVALUATION

Additional maintenance in the form of clearing and mowing the embankment is recommended.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. No design data were available for Tripoli Valley Dam.

b. Experience Data. The drainage area and lake surface area were developed from USGS Maramec Spring, Missouri, Quadrangle Map. The spillway and outlet data were surveyed during the inspection.

c. Visual Observations.

(1) A valve controlled, 6-inch diameter, steel pipe through the dam has been used to regulate releases. The pipe can be used for drawdown of the lake. (See photograph 9).

(2) A earth spillway with some grass cover located at the right side of the dam consists of a channel with a parallel guide levee at left and continuing downstream through a narrow rocky channel to a road right downstream of the dam. (See PLATES 5 and 4 and photographs 5 through 8). The grass on the spillway and channel is not in good condition and rocks show through some of the bare areas at channel.

(3) A few trees at the entrance of the spillway were observed.

d. Overtopping Potential. Tripoli Valley Dam can be overtopped by any flood greater than 10 percent of the Probable Maximum Flood (PMF). The Probable Maximum Flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. Tripoli Valley Dam can be overtopped by a 1 percent chance flood. A 1 percent chance flood is a flood with a 1 percent chance of being exceeded in any given year. The guidelines require that a dam of this hazard potential (high) and size pass at least 50 percent of the PMF without overtopping the dam. The maximum discharge over the dam for 50 percent of the PMF is 2200 cfs. The maximum depth of flow over the low point of the earth embankment by 50 percent of the PMF is 2.0 feet. The duration of overtopping is 5.3 hours.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Visual observations of the dam and spillway are discussed and evaluated in Sections 3 and 5. The dam has no other appurtenant structures.

b. Design and Construction Data. None available. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions and made matter of record.

c. Operating Records. No operating records were available.

d. Post Construction Changes. According to the owner's father, a large leak on the right side of the dam was repaired.

e. Seismic Stability. Tripoli Lake is located in Seismic Zone 1, for which the recommended guidelines for inspection assign a "moderate" damage probability. The relatively low height and the type of material of which the dam was constructed minimize the likelihood of failure due to earthquake shock.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. Several items are deficient which should be corrected. No erosion protection exists on the upstream slope of the dam. Cattle on the upstream slope and on the embankment loosens the earth and causes surface erosion. The upstream face of the embankment is not sufficiently protected against erosion. The left side of the spillway, which effectively is a protection dike for the area downstream of the embankment, is not sufficiently protected against erosion. Trees and heavy vegetation on the embankment provide a potential seepage hazard and animal habitat. The spillway is not adequately protected against erosion. The capacity of the spillway is insufficient to pass one-half of the PMF to PMF without overtopping the dam.

b. Adequacy of Information. The statements and recommendations in this report are based on visual observations and verbal discussions. Seepage and stability analyses are not on record as prescribed in the recommended guidelines. This is considered a deficiency which should be corrected.

c. Urgency. We recommend the remedial measures listed in Section 7.2 be accomplished in the near future. The item recommended in Paragraph 7.2d should be pursued on a high-priority basis.

d. Necessity for Phase II. No Phase II inspection is recommended.

7.2 REMEDIAL MEASURES

The following remedial measures are recommended:

a. Remove trees and cut heavy vegetation on the embankment.

b. Fill any animal burrows found during clearing.

c. Establish and maintain a grass cover on the embankment.

d. The spillway size and/or height of the dam should be increased to pass a minimum of one-half of the Probable Maximum Flood without overtopping the dam.

f. A stability and seepage analysis of the dam should be performed by a professional engineer experienced in the design and

construction of dams. These analyses should provide a design of seepage control works and other remedial measures related to embankment stability and erosion protection.

g. A detailed inspection of the dam and spillway should be made every two to five years by a professional engineer experienced in the design and construction of dams.

APPENDIX

HYDROLOGIC COMPUTATIONS

HYDROLOGIC AND HYDRAULIC ANALYSIS METHODOLOGY

1. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routing. The Probable Maximum Precipitation for those dams in the high hazard potential category is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33." Reduction factors have not been applied. A 24-hour storm duration is assumed with the 24-hour rainfall depths distributed over 6-hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF Determination). The maximum 6-hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6-hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF criteria. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use, and antecedent moisture conditions.

2. The reservoir routing is accomplished by using Modified Puls routing techniques wherein the flood hydrograph is routed through lake storage. Hydraulic capacities of the outlet works, spillway, and crest of dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-storage capacity curve. The hydraulic capacity of the outlet works, spillway, and top of dam are defined by elevation-discharge curves.

3. Dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This computation determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being overtopped. An output summary in the hydrologic appendix displays this information as well as other characteristics of the simulated dam overtopping.

4. The above analysis has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site are listed on the attached computer printout. Definitions of these variables are contained in the "User's Manual" for the computer program.

5. The rating curve for Tripoli Valley Lake Dam was computed by using HEC-2 backwater program to get a rating curve for the spillway. Flow over the dam was computed by using the broad-crested weir equation for sections of the dam of equal crest elevation. A "C" valve of 3.0 was used for the weir equation.

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P *

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  29 AUG 78
**********
    1                A        DAM          INSPECTION
    2                A        TRIPOLI         VALLEY          DAM
    3                A        PROBABLE        MAXIMUM         FLOOD
    4                B    288         0        5         0        0         0         0         0        -3         0
    5                B1     5
    6                J      1         9        1
    7                J1   .01       .05      .10       .15      .20       .25       .30       .50      1.0
    8                K      0         1        0         0        0         0         1
    9                K1       SUBAREA          RUNOFF            FOR           TRIPOLI           DAM
   10                R      1         2     .420         0        0       1.0
   11                P      0        20      100       120      130
   12                T      0         0        0         0        0         0        -1       -89         0       .03
   13                T2     0      .19
   14                X    -10      -.1      3.0
   15                K      1         2        0         0        0         0         1
   16                K1       RESERVOIR          ROUTING           FOR           TRIPOLI           DAM
   17                Y      0         0        0         1        1
   18                Y1     1         0        0         0        0         0   -695.1        -1
   19                Y4   895       896      897       898      899       900       901       902       903       904
   20                Y5     0        50      120       270      920      2214      4166      6535      9251     12268
   21                $A     0         6        8       8.3
   22                $E   871     895.1      898       905
   23                $$ 895.1
   24                $D 898.8
   25                K     99

                  PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                          RUNOFF HYDROGRAPH AT          1
                          ROUTE HYDROGRAPH TO           2
                          END OF NETWORK
```

PAC INSPECTION
TRIPOLI VALLEY DAM
PROBABLE PASHUP FLOOD

JOB SPECIFICATION

NQ	NRR	NPLN	IDAY	IPR	IPLP	IPTPC	IPLT	IPRT	RSTAN
288	0	5	0	0	0	0	0	-3	0
			JOPER	NWT	LKOPT	TPACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1
PTIOS= .01 .05 .10 .15 .20 .25 .30 .50 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

SUBAREA	RUNOFF		PCR		TRIPOLI				
	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	PATIO	ISPOW	ISAME	LOCAL
1	2	.42	0.00	.42	1.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	26.00	100.00	120.00	130.00	0.00	0.00	0.00

LOSS DATA

LKOPT	STRTF	DLTKR	RTIOL	ERAIN	STRTS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
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CURVE NO = -89.00 WETNESS = -1.00 EFFECT CN = 89.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .19

RECESSION DATA
STRTQ= -10.00 QRCSN= -.10 RTIOR= 3.00

UNIT HYDROGRAPH 13 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .19 VOL= 1.00

228.	735.	966.	647.	341.	194.	108.	60.	33.	18.
10.	6.	3.							

HO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	HO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	.00	.01	4.	1.01	12.05	145	.22	.21	.01	260.
1.01	.10	2	.01	.00	.01	4.	1.01	12.10	146	.22	.21	.01	363.
1.01	.15	3	.01	.00	.01	4.	1.01	12.15	147	.22	.21	.01	486.
1.01	.20	4	.01	.00	.01	4.	1.01	12.20	148	.22	.21	.01	577.
1.01	.25	5	.01	.00	.01	4.	1.01	12.25	149	.22	.21	.00	626.
1.01	.30	6	.01	.00	.01	3.	1.01	12.30	150	.22	.21	.00	654.
1.01	.35	7	.01	.00	.01	3.	1.01	12.35	151	.22	.21	.00	670.
1.01	.40	8	.01	.00	.01	3.	1.01	12.40	152	.22	.21	.00	679.
1.01	.45	9	.01	.00	.01	3.	1.01	12.45	153	.22	.21	.00	685.
1.01	.50	10	.01	.00	.01	3.	1.01	12.50	154	.22	.21	.00	688.
1.01	.55	11	.01	.00	.01	3.	1.01	12.55	155	.22	.21	.00	690.
1.01	1.00	12	.01	.00	.01	3.	1.01	13.00	156	.22	.21	.00	691.
1.01	1.05	13	.01	.00	.01	2.	1.01	13.05	157	.26	.26	.00	702.
1.01	1.10	14	.01	.00	.01	2.	1.01	13.10	158	.26	.26	.00	734.
1.01	1.15	15	.01	.00	.01	2.	1.01	13.15	159	.26	.26	.00	772.
1.01	1.20	16	.01	.00	.01	2.	1.01	13.20	160	.26	.26	.00	800.
1.01	1.25	17	.01	.00	.01	2.	1.01	13.25	161	.26	.26	.00	815.
1.01	1.30	18	.01	.00	.01	2.	1.01	13.30	162	.26	.26	.00	824.
1.01	1.35	19	.01	.00	.01	2.	1.01	13.35	163	.26	.26	.00	829.
1.01	1.40	20	.01	.00	.01	2.	1.01	13.40	164	.26	.26	.00	832.
1.01	1.45	21	.01	.00	.01	3.	1.01	13.45	165	.26	.26	.00	834.
1.01	1.50	22	.01	.00	.01	4.	1.01	13.50	166	.26	.26	.00	835.
1.01	1.55	23	.01	.00	.01	5.	1.01	13.55	167	.26	.26	.00	836.
1.01	2.00	24	.01	.00	.01	6.	1.01	14.00	168	.26	.26	.00	837.
1.01	2.05	25	.01	.00	.01	6.	1.01	14.05	169	.33	.32	.00	852.
1.01	2.10	26	.01	.00	.01	7.	1.01	14.10	170	.33	.32	.00	899.
1.01	2.15	27	.01	.00	.01	8.	1.01	14.15	171	.33	.32	.00	956.
1.01	2.20	28	.01	.00	.01	9.	1.01	14.20	172	.33	.32	.00	998.
1.01	2.25	29	.01	.00	.01	10.	1.01	14.25	173	.33	.32	.00	1020.
1.01	2.30	30	.01	.00	.01	10.	1.01	14.30	174	.33	.32	.00	1033.
1.01	2.35	31	.01	.00	.01	11.	1.01	14.35	175	.33	.32	.00	1040.
1.01	2.40	32	.01	.00	.01	12.	1.01	14.40	176	.33	.32	.00	1044.
1.01	2.45	33	.01	.00	.01	13.	1.01	14.45	177	.33	.32	.00	1047.
1.01	2.50	34	.01	.00	.01	13.	1.01	14.50	178	.33	.32	.00	1048.
1.01	2.55	35	.01	.00	.01	14.	1.01	14.55	179	.33	.32	.00	1049.
1.01	3.00	36	.01	.00	.01	15.	1.01	15.00	180	.33	.32	.00	1050.
1.01	3.05	37	.01	.01	.01	15.	1.01	15.05	181	.20	.20	.00	1022.
1.01	3.10	38	.01	.01	.01	16.	1.01	15.10	182	.40	.39	.00	974.
1.01	3.15	39	.01	.01	.01	16.	1.01	15.15	183	.40	.39	.00	1008.
1.01	3.20	40	.01	.01	.01	17.	1.01	15.20	184	.59	.59	.00	1142.
1.01	3.25	41	.01	.01	.01	17.	1.01	15.25	185	.69	.69	.00	1393.
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1.01	3.35	43	.01	.01	.01	19.	1.01	15.35	187	2.77	2.76	.01	3112.
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1.01	3.50	46	.01	.01	.01	20.	1.01	15.50	190	.59	.59	.00	4181.
1.01	3.55	47	.01	.01	.01	21.	1.01	15.55	191	.40	.39	.00	3225.
1.01	4.00	48	.01	.01	.01	21.	1.01	16.00	192	.40	.39	.00	2409.
1.01	4.05	49	.01	.01	.01	21.	1.01	16.05	193	.30	.30	.00	1967.
1.01	4.10	50	.01	.01	.01	22.	1.01	16.10	194	.3	.30	.00	1584.
1.01	4.15	51	.01	.01	.01	22.	1.01	16.15	195	.30	.30	.00	1332.
1.01	4.20	52	.01	.01	.01	23.	1.01	16.20	196	.30	.30	.00	1176.
1.01	4.25	53	.01	.01	.01	23.	1.01	16.25	197	.30	.30	.00	1091.
1.01	4.30	54	.01	.01	.01	24.	1.01	16.30	198	.30	.30	.00	1044.

1.01	4.35	55	.01	.01	.01	24.	1.01	16.35	199	.30	.30	.00	1014.
1.01	4.40	56	.01	.01	.01	24.	1.01	16.40	200	.30	.30	.00	997.
1.01	4.45	57	.01	.01	.01	25.	1.01	16.45	201	.30	.30	.00	990.
1.01	4.50	58	.01	.01	.01	25.	1.01	16.50	202	.30	.30	.00	987.
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1.01	5.00	60	.01	.01	.01	26.	1.01	17.00	204	.30	.30	.00	985.
1.01	5.05	61	.01	.01	.01	26.	1.01	17.05	205	.24	.24	.00	970.
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1.01	5.15	63	.01	.01	.01	27.	1.01	17.15	207	.24	.24	.00	866.
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1.01	5.35	67	.01	.01	.01	28.	1.01	17.35	211	.24	.24	.00	782.
1.01	5.40	68	.01	.01	.01	28.	1.01	17.40	212	.24	.24	.00	778.
1.01	5.45	69	.01	.01	.01	28.	1.01	17.45	213	.24	.24	.00	776.
1.01	5.50	70	.01	.01	.01	29.	1.01	17.50	214	.24	.24	.00	775.
1.01	5.55	71	.01	.01	.01	29.	1.01	17.55	215	.24	.24	.00	774.
1.01	6.00	72	.01	.01	.01	29.	1.01	18.00	216	.24	.24	.00	774.
1.01	6.05	73	.07	.05	.03	38.	1.01	18.05	217	.02	.02	.00	724.
1.01	6.10	74	.07	.05	.02	67.	1.01	18.10	218	.02	.02	.00	565.
1.01	6.15	75	.07	.05	.02	101.	1.01	18.15	219	.02	.02	.00	457.
1.01	6.20	76	.07	.05	.02	129.	1.01	18.20	220	.02	.02	.00	409.
1.01	6.25	77	.07	.05	.02	145.	1.01	18.25	221	.02	.02	.00	387.
1.01	6.30	78	.07	.05	.02	156.	1.01	18.30	222	.02	.02	.00	329.
1.01	6.35	79	.07	.06	.02	164.	1.01	18.35	223	.02	.02	.00	294.
1.01	6.40	80	.07	.06	.02	170.	1.01	18.40	224	.02	.02	.00	264.
1.01	6.45	81	.07	.06	.02	175.	1.01	18.45	225	.02	.02	.00	236.
1.01	6.50	82	.07	.06	.01	179.	1.01	18.50	226	.02	.02	.00	212.
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1.01	7.00	84	.07	.06	.01	186.	1.01	19.00	228	.02	.02	.00	170.
1.01	7.05	85	.07	.06	.01	188.	1.01	19.05	229	.02	.02	.00	152.
1.01	7.10	86	.07	.06	.01	191.	1.01	19.10	230	.02	.02	.00	136.
1.01	7.15	87	.07	.06	.01	193.	1.01	19.15	231	.02	.02	.00	122.
1.01	7.20	88	.07	.06	.01	195.	1.01	19.20	232	.02	.02	.00	110.
1.01	7.25	89	.07	.06	.01	197.	1.01	19.25	233	.02	.02	.00	98.
1.01	7.30	90	.07	.06	.01	198.	1.01	19.30	234	.02	.02	.00	88.
1.01	7.35	91	.07	.06	.01	200.	1.01	19.35	235	.02	.02	.00	79.
1.01	7.40	92	.07	.06	.01	202.	1.01	19.40	236	.02	.02	.00	71.
1.01	7.45	93	.07	.06	.01	203.	1.01	19.45	237	.02	.02	.00	70.
1.01	7.50	94	.07	.06	.01	204.	1.01	19.50	238	.02	.02	.00	70.
1.01	7.55	95	.07	.06	.01	206.	1.01	19.55	239	.02	.02	.00	70.
1.01	8.00	96	.07	.06	.01	207.	1.01	20.00	240	.02	.02	.00	70.
1.01	8.05	97	.07	.06	.01	208.	1.01	20.05	241	.02	.02	.00	70.
1.01	8.10	98	.07	.07	.01	209.	1.01	20.10	242	.02	.02	.00	70.
1.01	8.15	99	.07	.07	.01	210.	1.01	20.15	243	.02	.02	.00	70.
1.01	8.20	100	.07	.07	.01	211.	1.01	20.20	244	.02	.02	.00	70.
1.01	8.25	101	.07	.07	.01	212.	1.01	20.25	245	.02	.02	.00	70.
1.01	8.30	102	.07	.07	.01	213.	1.01	20.30	246	.02	.02	.00	70.
1.01	8.35	103	.07	.07	.01	213.	1.01	20.35	247	.02	.02	.00	70.
1.01	8.40	104	.07	.07	.01	214.	1.01	20.40	248	.02	.02	.00	70.
1.01	8.45	105	.07	.07	.01	215.	1.01	20.45	249	.02	.02	.00	70.
1.01	8.50	106	.07	.07	.01	216.	1.01	20.50	250	.02	.02	.00	70.
1.01	8.55	107	.07	.07	.01	216.	1.01	20.55	251	.02	.02	.00	70.
1.01	9.00	108	.07	.07	.01	217.	1.01	21.00	252	.02	.02	.00	70.
1.01	9.05	109	.07	.07	.00	217.	1.01	21.05	253	.02	.02	.00	70.
1.01	9.10	110	.07	.07	.00	217.	1.01	21.10	254	.02	.02	.00	70.
1.01	9.15	111	.07	.07	.00	218.	1.01	21.15	255	.02	.02	.00	70.

1.01	9.20	112	.07	.07	.00	219.	1.01	21.20	256	.02	.02	.00	70.
1.01	9.25	113	.07	.07	.00	219.	1.01	21.25	257	.02	.02	.00	70.
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1.01	10.05	121	.07	.07	.00	223.	1.01	22.05	265	.02	.02	.00	70.
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1.01	10.15	123	.07	.07	.00	223.	1.01	22.15	267	.02	.02	.00	70.
1.01	10.20	124	.07	.07	.00	224.	1.01	22.20	268	.02	.02	.00	70.
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1.01	10.30	126	.07	.07	.00	224.	1.01	22.30	270	.02	.02	.00	70.
1.01	10.35	127	.07	.07	.00	224.	1.01	22.35	271	.02	.02	.00	70.
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1.01	11.05	133	.07	.07	.00	226.	1.01	23.05	277	.02	.02	.00	70.
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1.01	11.20	136	.07	.07	.00	226.	1.01	23.20	280	.02	.02	.00	70.
1.01	11.25	137	.07	.07	.00	227.	1.01	23.25	281	.02	.02	.00	70.
1.01	11.30	138	.07	.07	.00	227.	1.01	23.30	282	.02	.02	.00	70.
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1.01	11.40	140	.07	.07	.00	227.	1.01	23.40	284	.02	.02	.00	70.
1.01	11.45	141	.07	.07	.00	227.	1.01	23.45	285	.02	.02	.00	70.
1.01	11.50	142	.07	.07	.00	227.	1.01	23.50	286	.02	.02	.00	70.
1.01	11.55	143	.07	.07	.00	228.	1.01	23.55	287	.02	.02	.00	70.
1.01	12.00	144	.07	.07	.00	228.	1.02	0.00	288	.02	.02	.00	70.
									SUM	33.80	32.40	1.40	10701R.
										(859.)	(823.)	(35.)	(3030.41)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .01	RATIO 2 .05	RATIO 3 .10	RATIO 4 .15	RATIO 5 .20	RATIO 6 .25	RATIO 7 .30	RATIO 8 .50	RATIO 9 1.00
HYDROGRAPH AT	1	.42	1	49.	243.	486.	729.	972.	1215.	1458.	2430.	4861.
	(	1.09)	(	1.38)(	6.88)(	13.76)(	20.65)(	27.53)(	34.41)(	41.29)(	68.82)(	137.64)
ROUTED TO	2	.42	1	18.	93.	235.	522.	764.	1037.	1303.	2229.	4642.
	(	1.09)	(	.50)(	2.64)(	6.67)(	14.78)(	21.64)(	29.37)(	36.89)(	63.11)(	131.44)

1

SUMMARY OF DAM SAFETY ANALYSIS
TRIPOLI VALLEY DAM

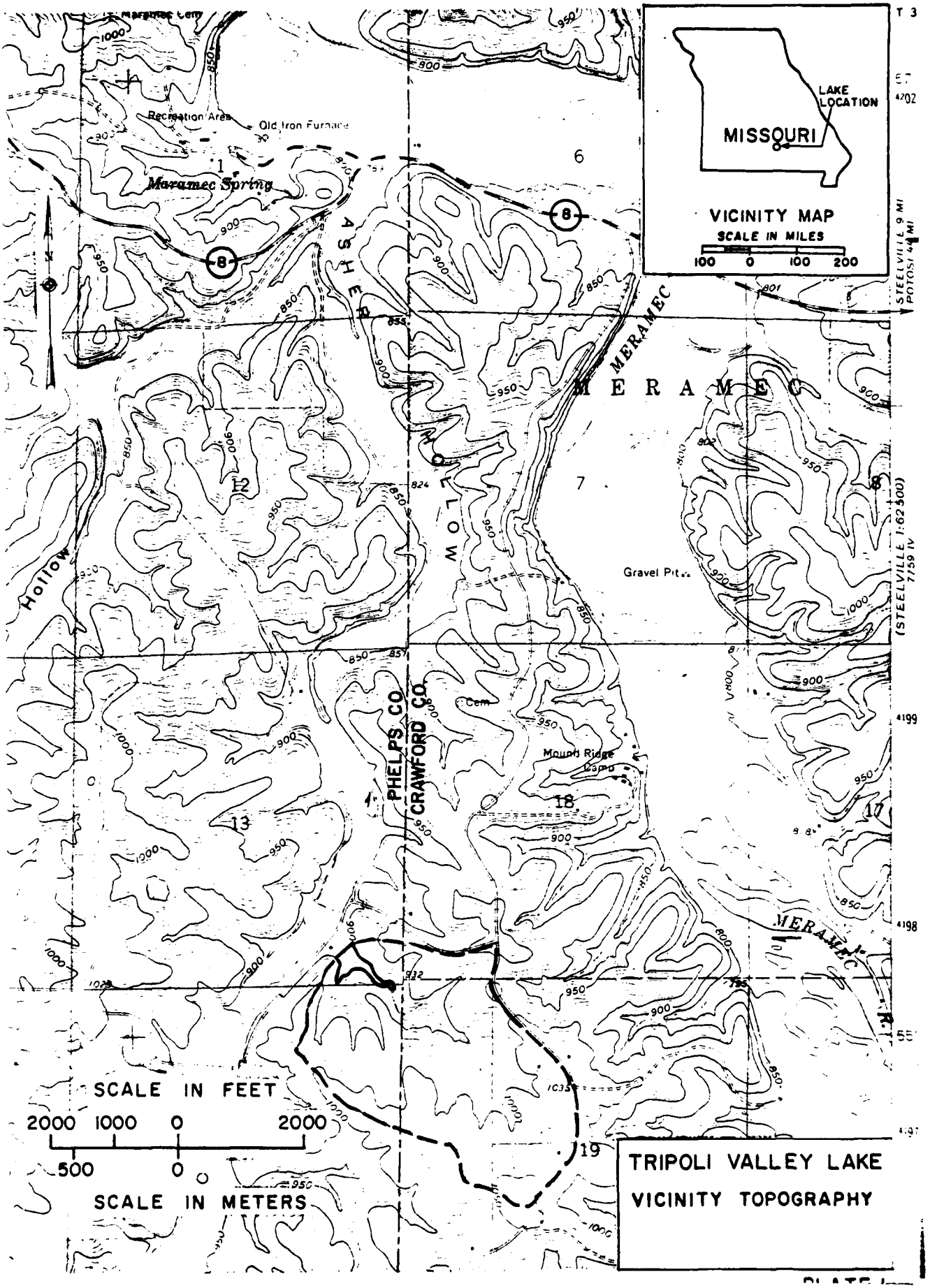
PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	895.10	895.10	898.60
STORAGE	48.	48.	68.
OUTFLOW	0.	0.	270.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.01	895.35	0.00	50.	18.	0.00	16.17	0.00
.05	896.62	0.00	58.	93.	0.00	16.08	0.00
.10	897.77	0.00	67.	235.	0.00	16.00	0.00
.15	898.39	.39	72.	522.	.58	15.92	0.00
.20	898.76	.76	75.	764.	.83	15.83	0.00
.25	899.09	1.09	77.	1037.	1.25	15.83	0.00
.30	899.30	1.30	79.	1303.	2.67	15.83	0.00
.50	900.01	2.01	85.	2229.	5.33	15.83	0.00
1.00	901.20	3.20	94.	4642.	6.50	15.75	0.00

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 29 AUG 78
****

EOI.
E>


LAKE LOCATION
MISSOURI
VICINITY MAP
SCALE IN MILES
100 0 100 200
Recreation Area
Old Iron Furnace
Meramec Spring
ASHER
MERAMEC
MOLL
Hollow
PHELPS CO.
CRAWFORD CO.
Gravel Pits
Mound Ridge Camp
Cem
SCALE IN FEET
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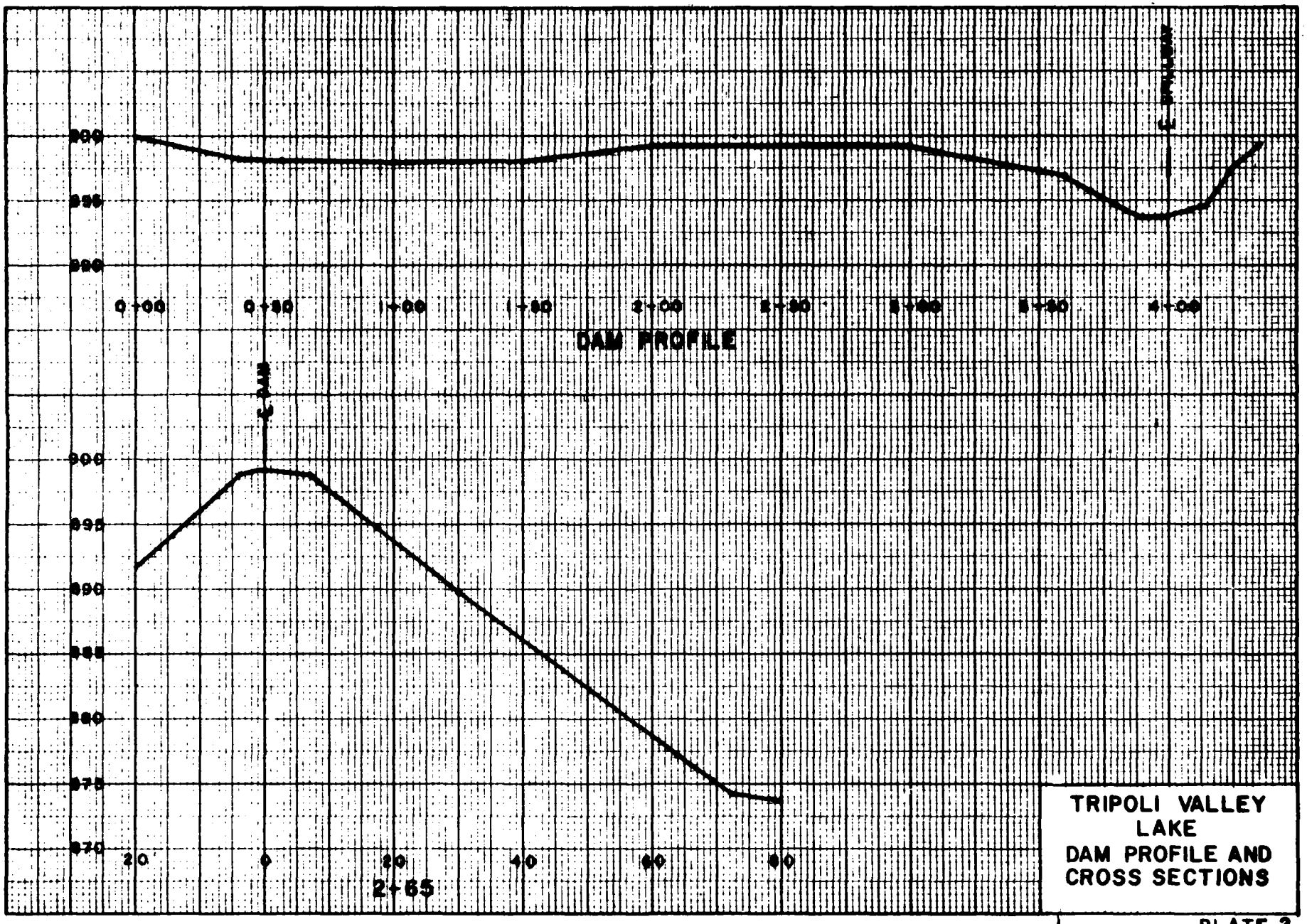
500 0
SCALE IN METERS
TRIPOLI VALLEY LAKE
VICINITY TOPOGRAPHY
(STEELVILLE 1:62500)
7.5 IV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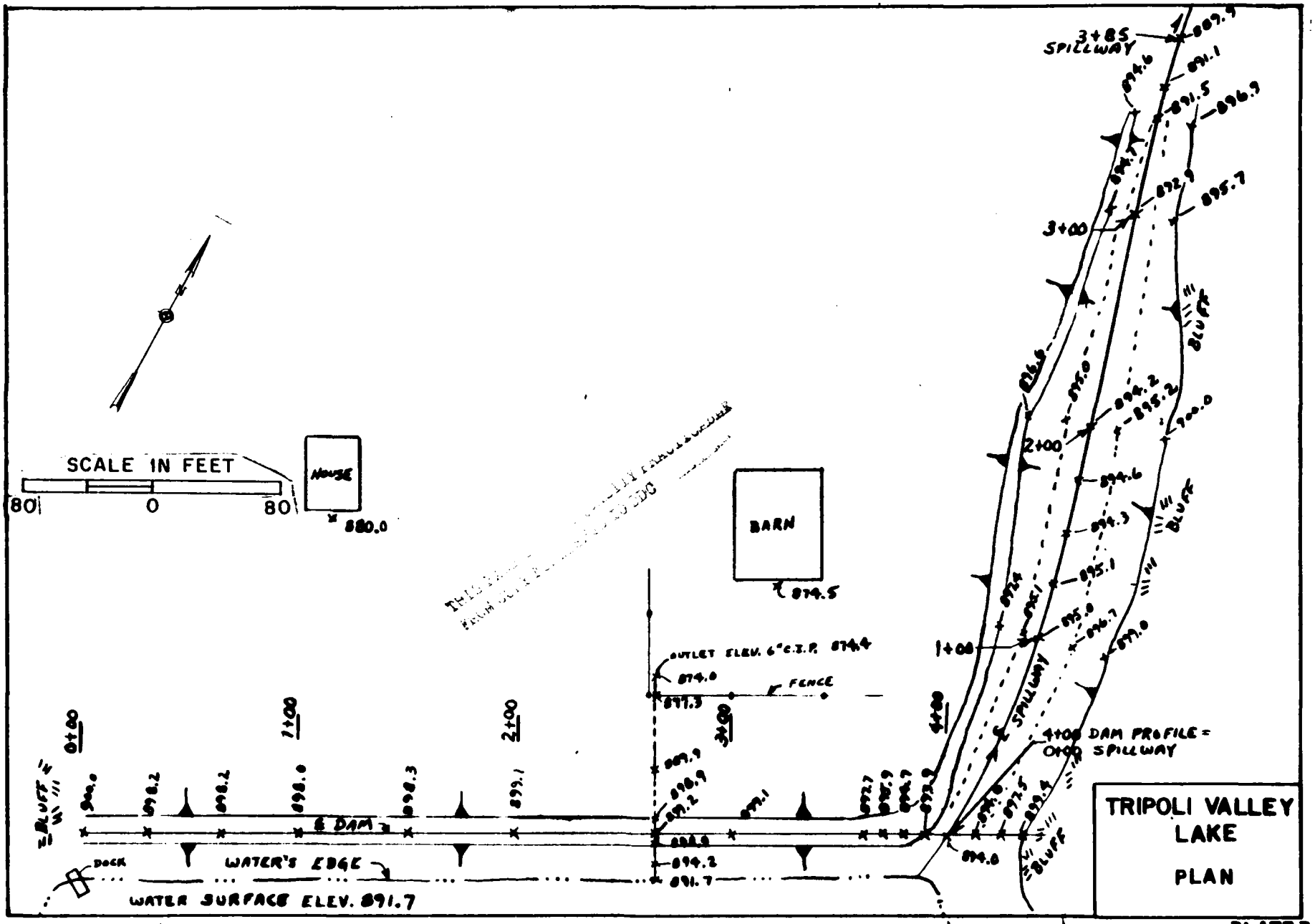
0+50
1+00
1+50
2+00
2+50
3+00
3+50
4+00
EMB
2+65
TRIPOLI VALLEY
LAKE
DAM PROFILE AND
CROSS SECTIONS

PLATE 2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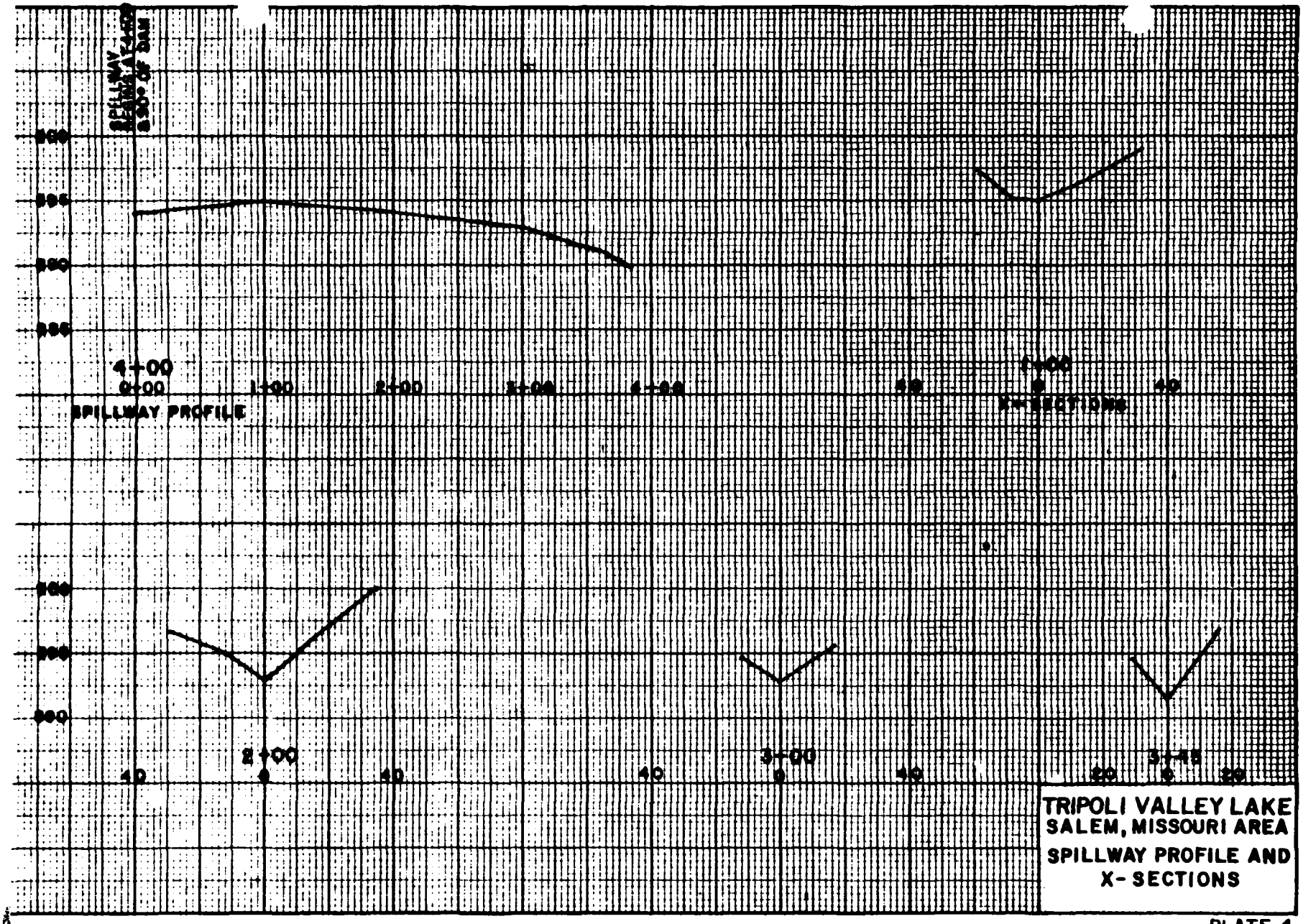
80
0
80
HOUSE
880.0
BARN
874.5
OUTLET ELEV. 6" C.I.P. 874.4
874.0
FENCE
891.3
0+00
1+00
2+00
3+00
4+00
BLUFF
DOCK
WATER'S EDGE
894.2
891.7
WATER SURFACE ELEV. 891.7
DAM
3+85
SPILLWAY
4+08 DAM PROFILE = 0+00 SPILLWAY
TRIPOLI VALLEY LAKE
PLAN

PLATE 3


SPILLWAY PROFILE
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1+00
2+00
3+00
4+00
40
0
X-SECTIONS
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3+45
TRIPOLI VALLEY LAKE
SALEM, MISSOURI AREA
SPILLWAY PROFILE AND
X-SECTIONS

PLATE 4

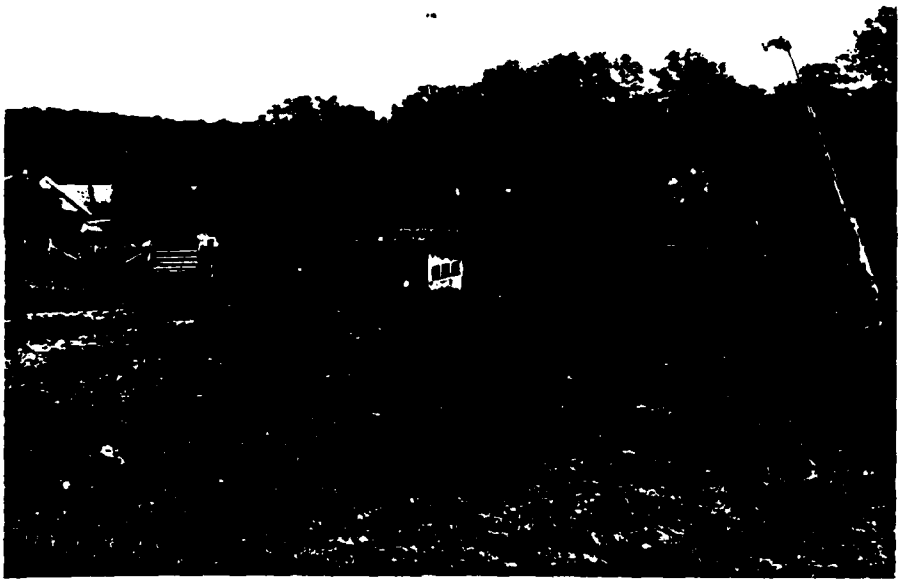


PHOTO 1 Downstream View

PHOTO 2 Looking Upstream from Spillway

PHOTO 3 Looking Along Crest of Dam

PHOTO 4 Upstream From Face of Dam

PHOTO 5 Spillway

PHOTO 6 Looking Downstream From Spillway

PHOTO 7 Looking Towards Lake From Spillway

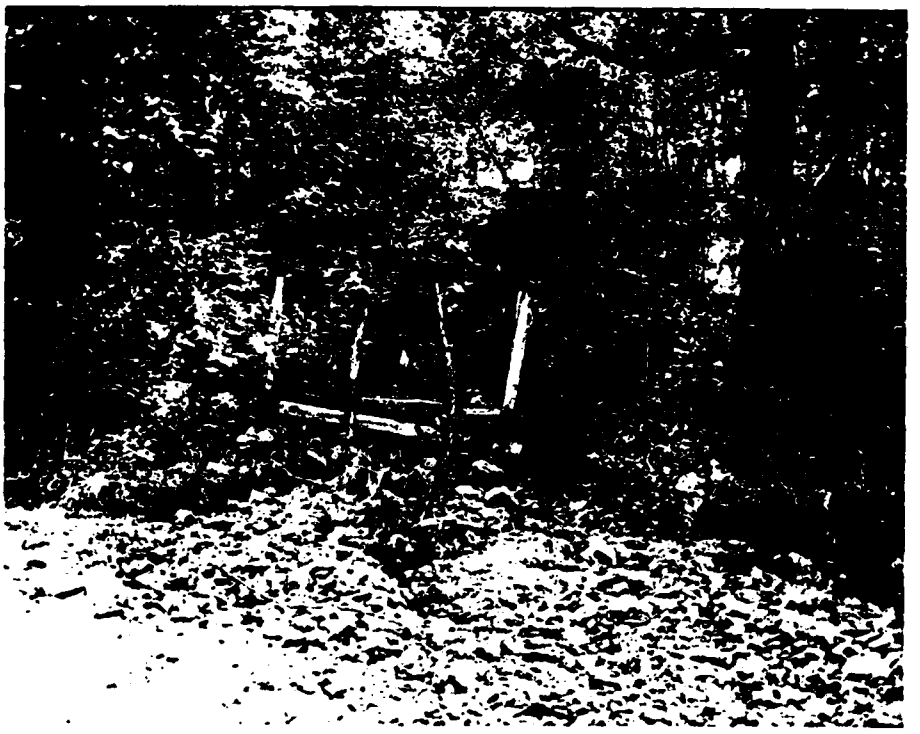
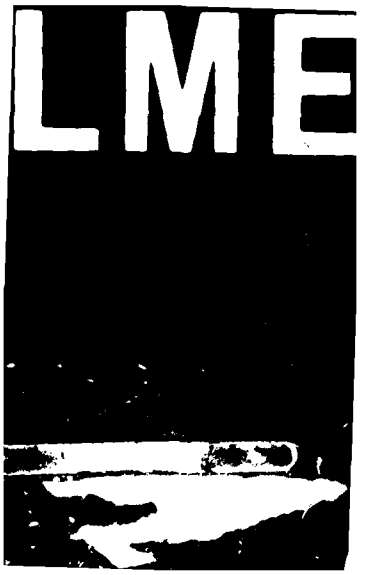


PHOTO 8 Spillway at Road Crossing

PHOTO 9 Discharge Valve

PHOTO 10 Marshy Area Near
Downstream Toe of Dam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